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6. A device as recited in claim 1 wherein said ferroelectric member is made of a ferroelectric material selected from the group consisting of a metal titanate, a metal tantalate, a metal niobate and a metal tungstate.

7. A device as recited in claim 1 further comprising a means for establishing an alternating electric field of decreasing amplitude to de-polarize said ferroelectric member.

8. A device as recited in claim 1 wherein said conduit has a first end and a second end and said portion of said conduit is located between said first end and said second end, said device further comprising:

10 a first electrode positioned adjacent to said ferroelectric member;

a first alternating current (AC) voltage source connected to said first electrode for polarizing said ferroelectric member;

15 a first driving electrode positioned between said first end of said conduit and said portion of said conduit;

a second driving electrode positioned between said second end of said conduit and said portion of said conduit; and

20 a second alternating current (AC) voltage source electrically connected to said first driving electrode and said second driving electrode to establish a potential difference between said first driving electrode and said second driving electrode.

9. A device as recited in claim 8 wherein a first layer of dielectric material is interposed between said first driving electrode and said electrolyte solution and a second layer of dielectric material is interposed between said second driving electrode and said electrolyte solution.

10. A device as recited in claim 9 wherein said first and second alternating current (AC) voltage sources have the same angular frequency.

11. A device as recited in claim 9 wherein said first and second alternating current (AC) voltage sources have different phase angles.

13. A system as recited in claim 12 wherein said conduit is a first conduit and said ferroelectric member is a first ferroelectric member and said system further comprises:

5 a second conduit formed with a lumen and having a first end
and a second end, said first end of said second conduit connected to
said first end of said first conduit at a junction with said lumen of said
first conduit in fluid communication and said lumen of said second
conduit at said junction;

10 a second ferroelectric member formed with a surface, said second ferroelectric member disposed along a portion of said second conduit with said surface oriented for contact with electrolyte solution in said lumen of said second conduit;

15 a means for polarizing said second ferroelectric member to place a charge on said surface of said second ferroelectric member; and

a means for establishing a potential difference across said portion of said second conduit to apply a force upon electrolyte solution in said lumen of said second conduit.

14. A system as recited in claim 13 further comprising a third
20 conduit formed with a lumen in fluid communication with said junction for
alternatively routing electrolyte solution from said third conduit between said
first conduit and said second conduit.

15. A system as recited in claim 13 further comprising a first reservoir containing a first electrolyte solution and a second reservoir containing a second electrolyte solution, said first reservoir connected to said second end of said first conduit and said second reservoir connected to said second end of said second conduit for selective mixing of said first electrolyte with said second electrolyte at said junction.

